

In re: Bastiaan Driehuys et al.

Serial No.: 09/804,369

Filed: March 12, 2001

Page 2

the lungs, the image signal intensity of which corresponds to the restriction, blockage or free passage of the pulmonary circulatory path.

8. (Amended) A method according to Claim 20, further comprising the step of administering the injection such that the gaseous polarized ^{129}Xe substantially dissolves into the vasculature proximate to the injection site.

10. (Amended) A method according to Claim 20, wherein said injecting step is carried out such that a major portion of the gaseous polarized ^{129}Xe remains substantially as a gas in the bloodstream and exhibits a T_1 in the bloodstream which is greater than about 8 seconds.

11. (Amended) A method according to Claim 20, wherein said NMR signal data obtaining step is performed in a low magnetic field, wherein the field strength is less than about 0.5T.

13. (Amended) A method according to Claim 20, further comprising the step of introducing a second quantity of a polarized gas to a subject via inhalation during a single imaging session.

14. (Amended) A method according to Claim 20, wherein said injection step is carried out intravenously.

18. (Amended) A method according to Claim 20, wherein said injection comprises multiple sequential injections thereby allowing for multi-shot MR imaging.

20. (Twice Amended) A method of evaluating a subject, comprising the steps of: positioning a subject having a pulmonary region and a blood circulation path including veins and arteries in an NMR system, the subject's pulmonary region having

In re: Bastiaan Driehuys et al.
Serial No.: 09/804,369
Filed: March 12, 2001
Page 3

pulmonary veins and pulmonary arteries and associated vasculature defining a pulmonary portion of the circulation path;

injecting a first quantity of polarized gaseous phase ^{129}Xe directly into at least one vein of the subject, wherein the first quantity of polarized gaseous phase ^{129}Xe is less than about 100 cubic centimeters;

obtaining NMR signal data associated with the injected polarized ^{129}Xe in the pulmonary region of the subject, the signal data including information corresponding to the polarized gas introduced in said injecting step;

generating an MRI image having spatial visual representation of the NMR signal data of the injected polarized ^{129}Xe ;

identifying the presence of at least one condition of blockage, restriction, abnormality, and substantially unobstructed free passage of the pulmonary circulation path;

providing a container configured to hold the first injectable quantity of polarized gaseous ^{129}Xe therein;

preparing the container to hold the first injectable quantity of polarized gaseous ^{129}Xe therein by introducing then expelling CO_2 from the container thereby leaving residual traces of CO_2 therein; and then

introducing the first quantity of polarized gaseous ^{129}Xe into the container prior to the step of injecting.

21. (Amended) A method for evaluating a subject, comprising the steps of:

positioning a subject having a pulmonary region and a blood circulation path including veins and arteries in an NMR system, the subject's pulmonary region having pulmonary veins and pulmonary arteries and associated vasculature defining a pulmonary portion of the circulation path;

injecting a first quantity of polarized gaseous phase ^{129}Xe directly into at least one vein of the subject, wherein the first quantity of polarized gaseous phase ^{129}Xe is less than about 100 cubic centimeters;

obtaining NMR signal data associated with the injected polarized ^{129}Xe in the

In re: Bastiaan Driehuys et al.

Serial No.: 09/804,369

Filed: March 12, 2001

Page 4

pulmonary region of the subject, the signal data including information corresponding to the polarized gas introduced in said injecting step;

generating an MRI image having spatial visual representation of the NMR signal data of the injected polarized ^{129}Xe ;

identifying the presence of at least one condition of blockage, restriction, abnormality, and substantially unobstructed free passage of the pulmonary circulation path; and

introducing a quantity of surfactant into a subject proximate to the injection site of the ^{129}Xe .

22. (Amended) A method of evaluating a subject, comprising the steps of:

positioning a subject having a pulmonary region and a blood circulation path including veins and arteries in an NMR system, the subject's pulmonary region having pulmonary veins and pulmonary arteries and associated vasculature defining a pulmonary portion of the circulation path;

injecting a first quantity of polarized gaseous phase ^{129}Xe directly into at least one vein of the subject, wherein the first quantity of polarized gaseous phase ^{129}Xe is less than about 100 cubic centimeters, wherein the first quantity of polarized gaseous phase ^{129}Xe is formulated as a gaseous phase product with ^{129}Xe being the primary constituent and devoid of liquid carrier components prior to injection;

obtaining NMR signal data associated with the injected polarized ^{129}Xe in the pulmonary region of the subject, the signal data including information corresponding to the polarized gas introduced in said injecting step;

generating an MRI image having spatial visual representation of the NMR signal data of the injected polarized ^{129}Xe ;

identifying the presence of at least one condition of blockage, restriction, abnormality, and substantially unobstructed free passage of the pulmonary circulation path; and

expelling the ^{129}Xe gas from a container into the subject during said injecting step such that the formation of large ^{129}Xe gas bubbles are inhibited during said injecting step.